remained, and the general look of the larvae was like *Tolype laricis* except in color.

The larvae moved very rapidly, and when at rest lay closely adhering to the twig of honey-locust, so flat as to be inconspicuous. The cast skins seemed to be thicker and more leathery than those of most Bombycid larvae. These larvae drank less than most that I have reared.

Cocoon. Aug. 5. The first one spun a thin parchment-like cocoon, 3-4 of an inch long, oval, slender, of a red-brown color mottled with gray. It spun very slowly, taking over two days.

Pupa. Aug. 11. The pupa was formed. It was 3-4 of an inch long, slender, dark brown, and had a white chalky substance all over it, which fell off when the pupa was touched.

PREPARATORY STAGES OF PHEOSIA DIMIDIATA H.S.

BY HARRISON G. DYAR.

PHEOSIA DIMIDIATA *Herrich-Schäffer.*

1854—Herr-Sch., Saml. ausser. schmett., p. 66, fig. 515, *Drymonia.*

1882—Grote, New check list, p. 19. *Pheosia.*

rimosa Packard.

1864—Pack., Proc. ent. soc. Phil., v. 3, p. 358.

1877—Lintner, Ent. cont., iv. p. 76 = *dictaea.*

1878—Tepper, Bull. Brook. ent. soc., v. 1, *sp. dist.*

1882—Goodhue, Can. ent. v. 14, p. 73.

1890—Packard, 5th rept. U. S. ent. comm., p. 455, *sp. dist.*

1891—Dyar, Psyche, v. 6, p. 128.

californica Stretch.

1873—Stretch, Zyg. & Bomb. N. A. v. 1, p. 116, pl. 4, fig. 5, larva, pl. 10. *Notodonta.*

1877—Lintner, Ent. cont., iv. p. 76, *pr. syn.*

Egg. Hemispherical, the base flat, smooth, sublustrous, white. Under the microscope it appears closely covered with dense, very small, rounded granulations, which are of about uniform size, but fused into a small white spot at the micropyle. Diameter 1.1 mm. Laid singly, usually on the under side of the leaves of its food-plants. The larva hatches by eating a hole in the side of the egg, but leaves the rest of the shell intact.

First stage. Head slightly bilobed, black and shiny; labrum white; a few hairs; width .6 mm. Joint 12 is slightly enlarged dorsally, otherwise the body is uniformly cylindrical. There is no trace of the caudal horn so conspicuous in the last stage. Body pale white; cervical shield, anal plate and thoracic feet black. From the minute elevated dots arise blackish hairs which are apparently not glandular but pointed at tip. A subventral broken blackish band which later changes to purple. Legs normal, the anal pair not elevated, all black outwardly. Near the end of the stage a purplish patch appears under the skin on joint 12 dorsally in the location of the piliferous dots of row 1, indicating the origin of the caudal horn. The piliferous dots of row 1 are close together on joint 12, more normal on joint 11 and almost in line with those of row 2 on the anterior segments. Row 3 are large, lateral; rows 4 and 5 small; row 6 distinguishable only on the legless segments and row 7 normal, on the venter of the apodal joints. In the latter

part of the stage the body is greenish white, the dots distinct and black.

Second stage. Head large, slightly bilobed, narrowing to the vertex, flattened in front; shining straw yellow, brown on the vertices of the lobes; mouth parts whitish; ocelli black; width 1.1 mm. Body slightly enlarged at joint 12 with a dorsal rounded conical process bearing two divergent setae; otherwise slender. Pale whitish green, the horn dark red brown, not shiny; a faint stigmatal yellowish band, bordered below by an interrupted dark red band. Thoracic feet black, the bases of the four anterior pair of abdominal feet black outwardly. The piliferous dots are absent, but the setae remain rather short, fine, blackish. The cervical shield is absent and the anal plate obscure.

Third stage. Head rounded, pale green, not shiny; mouth, antennae and ocelli brownish; a few short blackish hairs; width 1.7 mm. Body cylindrical, with a slight subventral ridge; joint 12 enlarged dorsally and continued into a process like a tapering horn, pointing straight upward, nearly 1 mm. long. Cervical shield and anal plate not distinct, concolorous with the body. Body whitish green, not shiny; an obscure yellowish stigmatal shade, below which is a dark red subventral band, somewhat interrupted; feet all dark red. The process on joint 12 is rounded at the tip and bears two minute divergent black setae. Similar setae arise from the obsolete piliferous dots. Spiracles brown, whitish centrally. The segments are faintly transversely creased.

Fourth stage. Head large, flattened in front, very slightly bilobed and uniform yellowish green in color; width 2.4 mm. Body cylindrical, slender, enlarged dorsally at joint 12 and bearing a conical nutant process, 1 mm. long, which bears two small divergent setae before the tip. The other setae on the body are also very minute. Color yellowish green; a substigmatal yellowish band and below it a dark red one, staining the bases of the legs. Thoracic feet dark red, the anal feet green. Spiracles large, white, narrowly ringed with black. The horn is red. As the stage advances the body becomes tinged with purplish except on the sides of joint 2. The spiracles are broadly surrounded by white.

Fifth stage. Head large, rounded, flattened in front, smooth, shiny pea green with a faint brownish tinge and obscurely mottled with little yellowish spots; mouth parts brownish; width 3.8 mm. Body long, slender at first, joint 12 produced upwards into a long conical horn, very thick at base. Anal plate large, nearly circular, but slightly excavated anteriorly with a knob-like elevation in the center and coarsely granulated. The body is at first green with a strong brownish purple tinge, especially in the middle of the segments; joint 2 clear green anteriorly. On each joint centrally a blackish purple transverse shade band, absent on joints 2, 5, and 11, complete on joint 3, tinging the bases of the legs on joint 4, most distinct on the bases of the legs on joints 7-10 and on joint 12 running posteriorly to the spiracle and broadly to the vertex of the horn which is pinkish posteriorly. Anal plate green, with a broad red-brown border. Spiracles large, black, surrounded with white and outside this by a purplish shade, the pair on joint 2 pale with a black border. A broad medio-ventral pale green band. Thoracic feet red-brown.

As the stage advances, the entire head and body become very shiny light purple, except the thoracic feet which are red and the anal plate which is colored as before. The blackish bands and ventral band remain as does also the coloration of the spiracles. There are no setae distinguishable except on the anal feet, but very slight ones can be made out with a lens in certain places. There are two orange spots on the feet on joints 7-10, separated by a black line; the anal feet are orange centrally. Some examples almost entirely lack the black bands except the one on the horn which is always present.

Cocoon. The larvae turn bluish and enter the ground to pupate, forming a cell lined with silk.

Pupa. Cylindrical, rounded at both ends, long in comparison with its width; uniform shiny black. The wing cases are wrinkled. The cremaster consists of two very short spines, some distance apart, and projecting almost laterally from the last segment, which nevertheless hold to the silken web with considerable firmness.

Length 26 mm.; width 8 mm.

Food plants. Poplar (Populus) and willow (Salix).

Larvae from Yosemite Valley, Cal. Two broods a year, the winter being passed in the pupa state.

TEMPERATURE EXPERIMENTS.

24 Vernon Terrace, Brighton,
10 Sept., 1891.

EDITOR OF PSYCHE, *Dear Sir*: — I have to thank you for the number of Psyche containing an abstract of one of my papers on the temperature experiments I have been making on some Lepidoptera. Will you permit me to point out a typographical error which may be misleading. In "general conclusion" no. 5, the figures "7" and "5" have been transferred, making my figures "57°" read as "75°." I may perhaps add that in order to bring out the *full* deep colouring in the *spring* emergence of illustraria, a somewhat lower temperature than 57° seems necessary, though that 57° is very effective. I find both emergences of all three of the English Selenias affected by temperature in the pupal stage, in colour, — as to markings I am not yet quite sure as regards lunaria and illunaria.

I am very glad you have seen fit to publish the experiments in America. I have always thought a country with such an abundance of Lepidoptera and such extremes of heat and cold would be especially productive of materials for such experimentation. Your distinguished naturalist, Mr. W. H. Edwards, has done much, and indeed I have only endeavoured to follow in his footsteps and work out results that he has not been able to follow out. We want such experiments also on single brooded species, some of which (e. g. *Ennomos autumnaria*) are certainly affected; and as to these it remains to be ascertained whether Prof. Weismann's theory applies (I by no means say it does not). Then the pupal period when the application is effective wants ascertaining. I have reason to think that (as in the Ajax experimented on by Mr. Edwards) the earliest stage is the sensitive one, and this makes it difficult to get in England American pupae in the proper stage. Hoping that some of your readers will take up this very interesting question—which will offer them the compensation for their labours certainly of presenting them with some beautifully coloured and probably not before seen varieties, and thanking you, I beg to remain,

Yours very truly,
F. Merrifield.

CHOICE OF FOOD.—In Psyche for October, page 166, is a note with the above title concerning *Platysamia ceanothi*. The habit mentioned does not appear abnormal when the species is observed in its native country, as many, if not most species in California seem to prefer the tender leaves at the ends of the twigs. This is true, not only of Bombycids, but of many butterflies. It is, probably, due to the fact that the leaves of many of the native trees become quite hard when mature, as for example, the live oak upon which the larvae of *Thecla grunus* feed. These larvae are unable to eat the nearly mature leaves, and starve if not furnished with growing tender ones. The principal food plants of *P. ceanothi* as observed by me in Yosemite were *Ceanothus integerrimus* and *Rhamnus californica*. The leaves of the former are very thin and tender, even when old, and the larvae readily ate them; of the latter, they preferred the young leaves at the ends of new shoots.

Harrison G. Dyar.